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## A NEW SPECIES OF RIODINIDAE FROM MEXICO

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THE TUXTLA MOUNTAINS comprise a small cluster of volcanic peaks rising abruptly out of the broad gulf coastal plain of southern Veracruz, Mexico. Their maximum elevation is only about 5100 feet but this is sufficient for them to have well developed (though small) zones of montane vegetation, notably pine-oak forest and even cloud forest. These environments are isolated by ninety miles or more of coastal lowlands from their nearest equivalents in the Sierra Madre Oriental and form a distinct biotic "island."

In 1962 Mr. Gary Ross spent several months in these mountains, collecting and studying the butterflies with particular emphasis on their ecology. On his return he sent his captures in the Lycaenidae and Riodinidae to me for determination. Among the riodinids was a single worn male of a species that defied identification. It looked something like *Hamearis*, a genus that is not known from Mexico at all, but in view of its condition and uniqueness, plus the fact that Mr. Ross was contemplating a second visit to the area, I simply noted on the specimen that it was probably new and elaborated on it in a covering letter.

Apparently the first thing Mr. Ross did on his return to the Tuxtlas in 1963 was institute a search for this puzzling riodinid. By great good fortune—the kind of good fortune that comes to those who know what they are about and who work at it—he not only found additional specimens but succeeded in prying from the species the remarkable secrets of its early stages. These he chronicles in the paper following this one.

Subsequent study based on the long series obtained in 1963 has shown that this riodinid is a member of the genus *Anatole* Hübner, a close relative of *Hamearis*. Interestingly enough it bears no close relation to *Anatole agave* Doubleday, Westwood and Hewitson, the only member of the genus previously known from Mexico, but finds its affinities in the South American A.

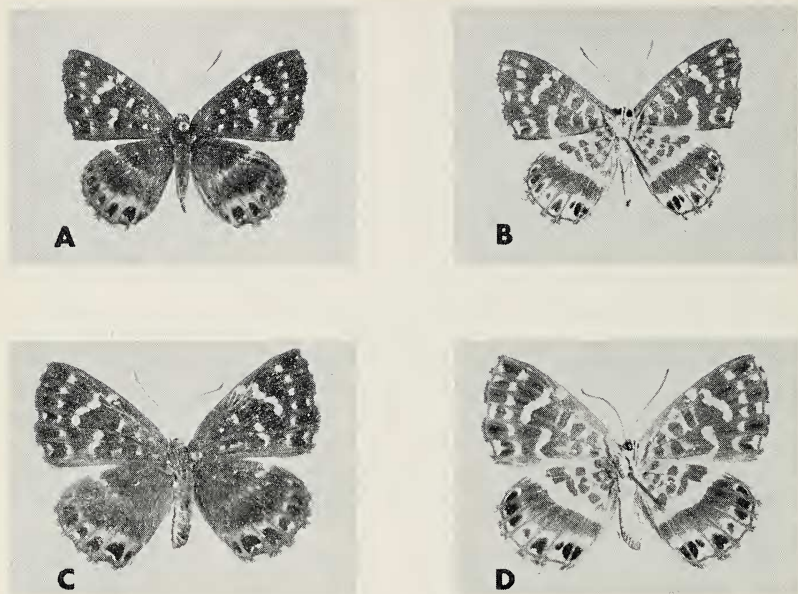


Fig. 1. *Anatole rossi*, new species: A, male holotype, upperside; B, male holotype, underside; C, female paratype, upperside; D, female paratype, underside. All figures natural size. Photos by R. M. Fox.



Fig. 2. *Anatole zygia* Hübner. A, male, upperside; B, male, underside; C, female, upperside; D, female, underside. Photos by R. M. Fox.

*zygia* Hübner. It is tempting to suppose that this new species is a manifestation of the insularity of the Tuxtlas, a relict, endemic form; but other areas exist where its food plant occurs and the ecology is otherwise similar, and until they can be checked it would be decidedly premature to draw such a conclusion.

It is particularly appropriate, as well as a great pleasure, to name this new species in honor of its discoverer and biographer, Mr. Gary N. Ross.

ANATOLE ROSSI, new species

Male (Figs. 1A and B).

Vertex with rufous hair scales mixed with broader gray scales, narrowly white along the margins of the eyes; frons with rufous hair scales, becoming grayer and mixed with white ventrally, underlain by some gray scales centrally, white along the eye margins. Antennae black, the club tipped with orange (the last 4 to 6 segments). Palpi white laterally and ventrally, black dorsally. Thorax dark brown above, white below; legs white, the meso- and metathoracic pairs becoming gradually light gray distally, the mesothoracic pair with a gray-brown spot dorsally at the apex of the femur. Abdomen dorsally dark brown with a thin line of white scales along the posterior edge of each segment except the basal two (incomplete-lateral only- on the second), white ventrally, the demarcation between the two colors quite abrupt.

**Upperside.** Both wings dark brown, nearly black. Fore wing with two white spots in the cell, a small one just before origin of  $Cu_2$  and a larger one just before origin of  $Cu_1$ ; in cell  $Cu_2-2A$  a minute spot in extreme base and two slightly larger ones just beyond, the latter barely distad of the origin of  $Cu_2$ ; a postmedian row of prominent quadrate white spots, widely disjunct at  $Cu_1$ , the apical part of the row nearly straight, arising a little beyond middle of costa and directed towards the end of  $Cu_2$ , the component spot in interspace between  $R_{3+5}$  and  $M_1$  smaller than the rest and displaced a little distad; the posterior part of the row straight in general trend, arising on inner margin at two-thirds and directed toward the costal end of the anterior part of the row (i. e., toward a point a little beyond middle of costa, this posterior part thus angled inward slightly), ending at  $Cu_1$ , the inner edge of the line at the origin of that vein; a subterminal row of subequal, smaller white spots parallels termen, the one in  $Cu_2-2A$  duplex; beyond these the ground color is black, at least posteriorly, with traces of a few white spots distad. Beginning distad of the postmedian spots and extending to termen the posterior veins are longitudinally broadly streaked with orange: veins  $Cu_1$ ,  $Cu_2$  and  $2A$  always, and occasionally to some extent on the more costal veins as well. Fringe black, with white between the veins from apex to  $M_1$ , between  $M_3$  and  $Cu_1$  and between  $Cu_2$  and  $2A$ . Hind wing: the dark brown ground color extends distad from base at least two-thirds the length of the wing, crossed by an obscure, straight, whitish line from costa just before end of vein  $Sc$  diagonally across to middle of inner margin. The line is variably developed from light brownish and thin to pure white and thick, and tends to be stronger costad than elsewhere. The longitudinal orange streaks on the veins are strongly developed and proximally coalesce to form an orange subterminal band; distally the streaks separate a series of strong, thick, jet-black lunules, with minute traces of white spots both distally and proximally. Fringe black with white between the veins, broadest in  $M_3-Cu_1$  and  $Cu_2-2A$ , narrower in the other interspaces.

**Underside.** Both wings dark gray, slightly brownish. Fore wing with all white markings as on upperside but larger, the postmedian row of spots connected to one another to form a band, disjunct as on upperside. The basal spots include an extra two in the base of the cell, the innermost of which extends costad of the cell; the dark areas between these spots are tinged reddish, particularly in the cell. The terminal white spots are much larger, appear as transverse white lines (in  $M_3-Cu_1$  and  $Cu_2-2A$ ) or thin crescents, convex outwards (in  $R_3-R_5-M_1$ ), hence present in those interspaces where the fringe is white, absent from those where the fringe is black. Hind wing with the diagonal straight band heavier, pure white, distally delimiting a basal area where there are numerous reddish or grayish spots in a white field. A terminal series of oval white spots, gradually diminishing in size costad, each one rounded or even acute basally and flat distally; each encloses completely an oval brownish or jet black spot, the ones in  $M_3-Cu_1$  and anterior half of  $Cu_2-2A$  small and punctiform, the others large, anteriorly nearly filling the white spots. Vein  $2A$  prominently, but very narrowly, lined with bright orange distally.

Female (Figs. 1C and D).

Similar to the male, but with these differences: averaging slightly larger; all white markings above tend to be larger and sometimes to coalesce partly; the orange vein streaking is much more prominent and more extensive, particularly on the fore wing where it may affect the veins as far costad as  $M_1$ ; sometimes the orange is proximally coalesced (as on the hind wing) at the level of the subterminal white spots, which the orange then surrounds without, however, obscuring them.

Male genitalia (Fig. 3). In comparison with those of Anatole zygia (Fig. 4), the male genitalia of A. rossi show the following differences: the uncus+tegumen is proportionately longer, the uncus lobes more rounded; the falces are longer, the vinculum less deeply sinuate in lateral view; the valva, though of about the same size, ends in a smaller, more acuminate hook; the saccus is shorter, more rounded; the penis is about the same size but is much more strongly downcurved, and the bend begins more proximally; the tip is abruptly constricted, not gradually and regularly so as in zygia; the cornuti consist of slender spines, thinner, longer and much more numerous than in zygia (their close compaction, as seen in the figure, is individual; in other specimens examined they are more regularly and widely dispersed); the anellus is considerably longer, the elongation occurring in the proximal part. Coincident with the change in sinuosity of the vinculum the valvae in rossi are nearly parallel to the dorsal edge of the uncus+tegumen, while in zygia they are rotated upward through an angle of roughly 52°.

The pregenital sternite (zygia, Fig. 5A; rossi, Fig. 5B) is similar in the two species, though that of rossi is more bell-shaped, with a stronger shoulder curve and lateral expansions at the base.

Female genitalia (Fig. 6A and B). Of an essentially simple type, the ductus bursae very long, sclerotized posteriorly (over a distance about four times its flattened width); corpus bursae with two feather-shaped signa, each ending anteriorly in a long, free spine with a serrated edge. Within the corpus bursae of the specimen examined were found three spermatophores, each nearly as long as the corpus bursae itself, arranged regularly inside and together completely filling the sac. Each spermatophore was rather bottle-shaped, its narrow end about the diameter of the ductus bursae and directed posteriorly. Two of them were intact, while the third was ruptured immediately opposite one of the signa.

Length of forewing. There are evidently three broods or flights represented in the series, one chiefly in June (recorded dates, 7 June to 4 July), one in late July and early August (recorded dates, 12 July to 13 August) and a third, represented by only one specimen taken 23 October 1962, Mr. Ross' first capture of the species. There appears to be a slight difference in size between the first two flights and they are accordingly recorded separately.

June flight: males, 15.5 - 19.5 mm.; mean, 18.3 mm.; standard deviation, 1.04 mm.; sample size, 15. Females, 18-23 mm.; mean, 18.9 mm.; standard deviation, 1.38 mm.; sample size, 13.

July-August flight: Males, 16-19 mm.; mean, 17.6 mm.; standard deviation, 0.93 mm.; sample size, 13. Females, 15-21 mm.; mean, 18.9 mm.; standard deviation, 1.56 mm.; sample size, 14.

The single October male measured 16 mm.

Holotype, male, 1/4 mi. ESE of Ocozotepec, 1950 feet, Tuxtla Mountains, Veracruz, Mexico, 1. viii. 1963, leg. Gary N. Ross.

Paratypes, 28 males and 27 females in all, all from the Tuxtla Mountains, Veracruz, Mexico, 1963 (except one, as noted), leg. Gary N. Ross, as follows:

Ocotal Chico: 1800 ft., 4. viii (1 male, genitalia slide C-993), 8. vi (4 females); 1900 ft., 7. vi (2 males, 2 females); 1/2 mi. SE or SSE, 1800 ft., 23. vi (1 male), 25. vii (1 male), 26. vii (1 male, genitalia slide C-984); 1/4 mi. E, 1900 ft., 9. vi (3 males, 2 females); 1/4 mi. SE, 1950 ft., 1. viii (1 male); 1/4 mi. N, 2100 ft., 11. vi (1 male, genitalia slide C-1001, +2 males), 15. vi (1 male), 18. vi (1 female); 1-1/4 mi. N, 2200 ft., 26. vii (1 female); 1 mi. S, 1800 ft., 7. vi (1 male, genitalia slide C-1003, +1 male); 1-1/4 mi. NE, 2600-2700 ft., 16. vi (1 female), 12. vii (1 male); 1/4 mi. SSE, 1700 ft., 8. vi (2 females); 1 mi. SSE, 1800 ft., 23. x. 1962 (1 male).

Ocotal Grande: 1900 ft., 19. vi (1 male), 4. vii (1 male); 1/4 mi. E, 1800 ft., 19. vi (1 female); 1 mi. E (elev. ?), 8. viii (1 male).

Ocozotepec: 2000 ft., 1. viii (3 males, 4 females); 1/4 mi. SE, 1950 ft., 1. viii (1 female, genitalia slide C-994, +5 females); 1/4 mi. ESE, 1950 ft., 1. viii (2 males, 3 females); 1-1/4 mi. NE, 2600 ft., 16. vi (1 male).

Mecayapan: 1-1/4 mi. E, 1025 ft., 13. viii (1 male).

Holotype and 3 male, 4 female paratypes, Carnegie Museum Entomology type series no. 503. Paratypes will be distributed to a number of institutions, including the United States National Museum, the American Museum of Natural History, the British Museum (Natural History). The remaining paratypes are in the collection of Mr. Ross.

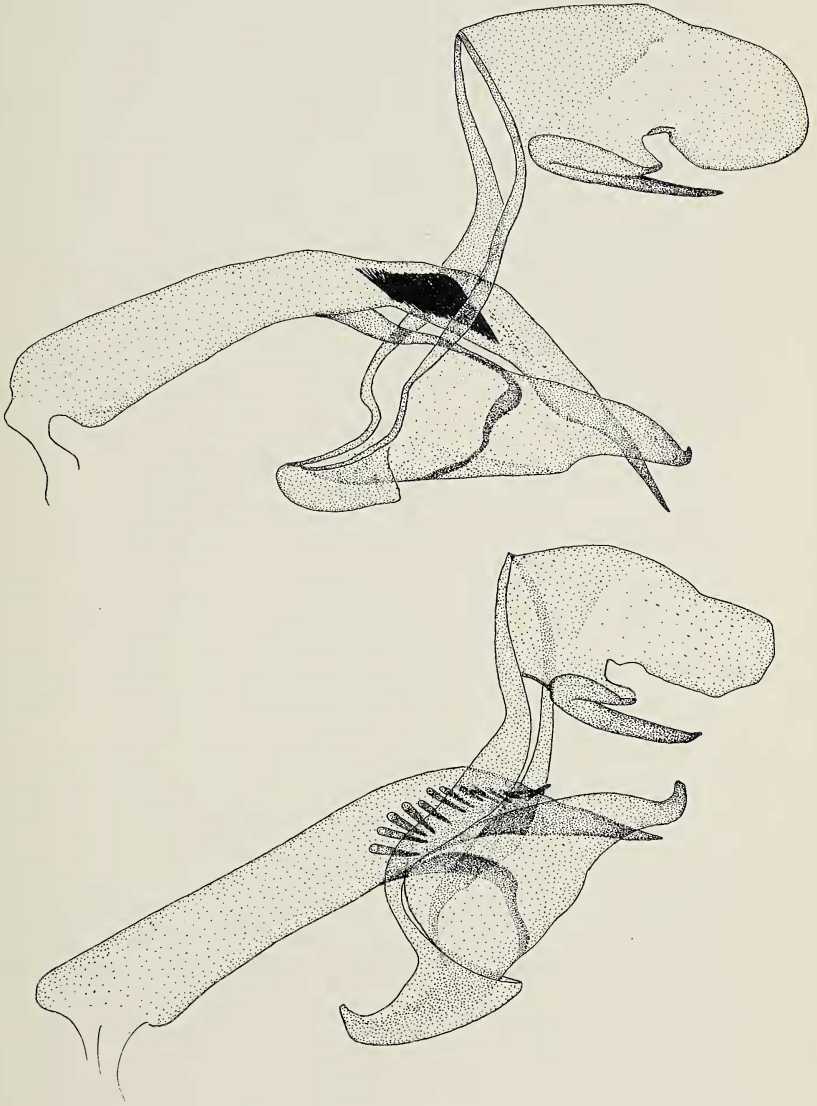


Fig. 3. *Anatole rossi*, new species. Male genitalia (paratype, slide no. C-993).

Fig. 4. *Anatole zygia* Hübner. Male genitalia (Benevides, Para, Brasil, October 1918, leg. S. M. Klages, slide no. C-990).

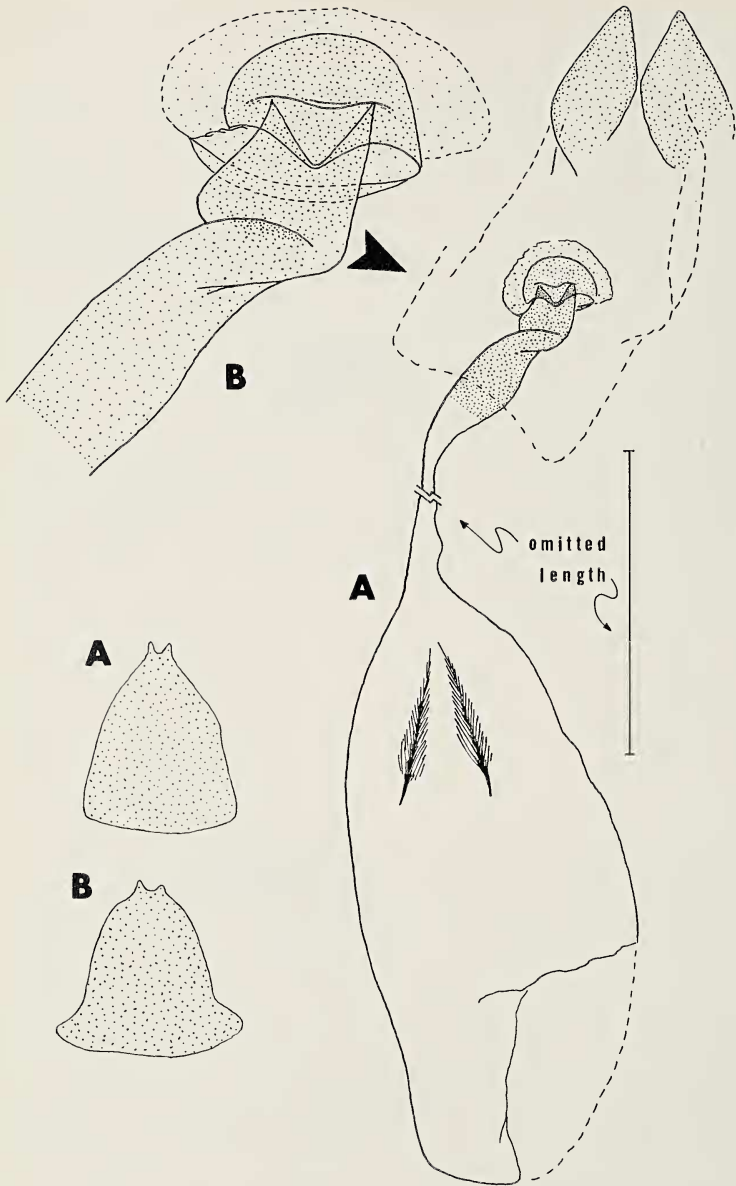


Fig. 5. Male pregenital sternites: A, *Anatole zygia*; B, *Anatole rossi*.

Fig. 6. *Anatole rossi*, new species. Female genitalia (paratype, slide no. C-994): A, papillae anales and bursa copulatrix (an undifferential portion of the ductus bursae is omitted as shown), B, enlarged view of the posterior part of the ductus bursae and ostium bursae.

*Remarks.* As was noted in the introductory remarks *Anatole rossi* is most closely allied to *A. zygia* Hübner, the type of the genus and a species known only from South America. The two are very distinct, however, as the following comparison shows. In *A. rossi* the hind wing is evenly rounded, not tornally produced as is true of *zygia*; the orange vein streaking of *rossi* is represented in *zygia* only on the fore wing and only on vein 2A, where it occurs in the form of a small, round (not elongate) orange spot centered on the vein subterminally. On the hind wing *zygia* has a discal patch of yellow orange without counterpart in *rossi*, and also in *zygia* the entire area posterior to  $Cu_2$  from one-third out from base to the termen is pure white save for a few isolated subterminal black spots: also without counterpart in *rossi*. The postmedian and subterminal white spots are smaller and obsolescent in *zygia* and the postmedian row has a slightly different configuration than in *rossi*. In the latter the spot in  $M_3-Cu_1$  is displaced very slightly basad while in *zygia* it is displaced a little distad (in both cases, relative to the trend of the anterior part of the series). On the underside the ground color of *zygia* is mostly orange on the fore wing (instead of the gray-brown of *rossi*) and *zygia* has most of the hind wing white.

The only other *Anatole* in Mexico is *A. agave* Godman & Salvin, which differs from both *rossi* and *zygia* in so many ways (*e.g.*, in the much shorter palpi) that it possibly should be referred to a different genus altogether.

*A. rossi* exists in two forms: the "normal" form (as illustrated) which is the commoner of the two by far; and a variant form differing as follows: perhaps slightly larger; orange vein streaking extending much farther costad (to  $M_1$  on fore wing; to Rs on hind wing), the streaks proximally more heavily conjoined; fore wing with postmedian white spots larger, tending to fusion. The form has been noted only in the June flight and it occurs then along with "normal" specimens. Genitally there is no difference whatever between this form and the "normal" form and in response to an inquiry of mine on the subject, Mr. Ross said that there was no field evidence, either in behavior or in ecology, that would suggest that more than a single species was involved.

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